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# Producing Slaughter Steers With Grain Self–Fed on Pasture

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## INTRODUCTION

Livestock producers in Louisiana and the Southeastern section of the United States are realizing more each year their advantages in forage production over other sections of our country. The geographical location makes possible the production of both winter and summer pastures. While summer pastures have a very high carrying capacity, the winter pastures are a real bonus in the production of beef.

Many producers are holding spring-dropped calves after weaning, grazing them on winter pastures, and selling them as yearling cattle the following spring. There is still a great deal of interest in the production of finished beef in Louisiana and the southern United States.

There has always been a discrimination against grass fattened beef because of the yellow color of the fat. Even so, profits are usually greater in a steer fattening program when pasture replaces a portion of the grain.

It is the authors' belief that finishing steers on pasture has many advantages. When fattening steers on pasture, the grain should be used as a supplement to the pasture and not as a substitute for the pasture.

This publication reports three trials conducted at the Northeast Louisiana Experiment Station, St. Joseph, Louisiana. Five rations were self-fed to grazing steers for a period of 299 days. All cattle were slaughtered and their carcasses evaluated.

## PREVIOUS WORK

Research at the Northeast Louisiana Experiment Station has shown that slaughter cattle weighing 900 to 1,000 pounds can be produced by using a combination of forage crops and limited concentrates. The carcasses with a thin rind of external fat and sufficient quality to grade U.S. Good to Choice were highly acceptable to packers (Carpenter and Klett, 1969).

Carpenter et al. (1968) found that by feeding a limited amount of

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grain to grazing cattle over 312 days, a thin rind fat and exceptional marbling were obtained. This method was superior to two other programs on the basis of weight at slaughter, average daily gain, number of carcasses grading Choice, feed efficiency, and time required to finish the steers.

Chapman et al. (1967) reported that the use of limited amounts of concentrates on good-quality pasture has almost always resulted in greater returns than pasture alone. The use of a limited amount of concentrate feed will result in more gain, higher dressing percent, quicker inventory turnover, and better packer-buyer acceptance of the cattle. They also reported that a full-feed of concentrate ration should not be fed to calves on pasture to produce slaughter steers. Research indicated that the economical level of supplemental feed to use on pasture would range from 0.5 to 1% of the body weight of the cattle (Chapman et al., 1967).

Chapman, Haines, and Kidder (1964) stated that the feeding of 6 pounds of a mixed feed having a crude protein content of 10 to 12% usually produced approximately 0.67 pound more gain than pasture alone.

Wise, Barrick, and Blumer (1965) self-fed a mixture of corn with 10% animal fat and used soybean meal, clover, and extra nitrogen added on forage, to determine the need for supplemental protein of steers grazing grass pastures. These investigators found that gains were not significantly changed by adding protein in the feed as soybean meal, in the forage as clover, or in the form of extra nitrogen added to growing forage. They did find, however, that the addition of soybean meal increased the daily feed intake by 2 to 3 pounds per head, resulting in more costly gains for this group.

Suman and Woods (1966) at the South Carolina Station compared yearling steers grazing Coastal bermudagrass with and without supplemental feeding. The supplements used were cottonseed meal, Coastal bermudagrass pellets, and ground shelled corn. Coastal bermudagrass gave beef gains of approximately 610 pounds per acre when fertilized with 200 pounds of nitrogen. Small additional gains were made with the protein supplements, but with ground shelled corn fed at 1% of the body weight, seasonal gains were over 1,300 pounds per acre for two of the three years.

Wise et al. (1967) at the North Carolina Station reported that steers grazing Coastal bermudagrass pasture alone gained an average of 1.15 pounds daily. Supplementation with 1.5 pounds of soybean meal resulted in a 0.25-pound per day increase in gain. Grazing steers were self-fed 80% corn plus 10% soybean meal plus 10% animal fat, or 90% corn plus 10% animal fat. These rations self-fed on grass resulted in daily gains of approximately 2.2 pounds, with added protein producing only 0.1 pound more gain per head daily. Carcasses produced by pasture alone

or pasture plus soybean meal were primarily Standard, while those produced on the self-fed treatment were primarily Good with a few Choice carcasses.

## PROCEDURE

### Treatment of Pastures

Pastures used were fescuegrass, Coastal bermudagrass, and common bermudagrass. All pastures were on established plots with a good stand of grass. The fescuegrass pastures were topdressed with 67 pounds of nitrogen per acre each September and with 33.5 pounds of nitrogen per acre in February or March of each year. Bermudagrass pastures were topdressed with 67 pounds of nitrogen per acre each April and with 33.5 pounds of nitrogen per acre in July or August. Both Coastal and common bermudagrass pastures were overseeded each November with common ryegrass at the rate of 25 pounds per acre. After the ryegrass seeding, each bermudagrass pasture was topdressed with 33.5 pounds of nitrogen per acre. All pastures furnished abundant, high-quality forage.

### Handling of Cattle

Weanling beef steer calves were purchased each year in October. These calves averaged 453 pounds and graded Good. All calves were number-branded soon after arriving on the Station. They were wormed approximately two weeks after purchase and again in May of the following year. They were sprayed to control lice, and back-rubbers were provided to control flies. Each calf received a 24-milligram implant of diethylstilbestrol in October and a second implant of 24 milligrams in May.

Each year the 60 beef calves were assigned at random to one of five treatments and placed on pasture. Each group of 12 calves had access to 12 acres of pasture. The pastures available to each group were four acres of fescuegrass, four acres of Coastal bermudagrass, and four acres of common bermudagrass.

The grazing of pastures was divided into two periods. The 196 days from November to May were considered as the winter pasture period and the 103 days from May to September were considered as the summer grazing period. In addition to the grazing, each lot was self-fed one of the rations shown in Table 1 for 299 days.

All rations contained salt or salt and whole cottonseed. An attempt was made to formulate these rations so that the daily intake would be approximately 1% of the animal's live weight. Only one ration (II) contained urea.

Previous research at this Station has shown that pastures can be stocked at the rate of one and one-half to two steers per acre when a

**TABLE 1.—Concentrate Rations[1]**

| Feedstuff | Ration number[2] | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| Yellow corn meal, lb. | 1,440 | 1,760 | 1,690 | 1,490 | 1,790 |
| Cottonseed, lb. | 300 | | | 250 | |
| Urea, lb. | | 30 | | | |
| Calcium carbonate, lb. | 10 | 10 | 10 | 10 | 10 |
| Salt, lb. | 250 | 200 | 300 | 250 | 200 |
| Total, lb. | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |

[1]Aureomycin was added to each ration at the level of 70 mg/5 lb. of feed.

[2]The calculated crude protein contents of the rations were 9.9, 11.4, 7.6, 9.6, and 8.1%, respectively.

grain supplement is furnished in addition to the grazing. But in this experiment pastures were purposely stocked at the rate of one steer per acre so that grass would not be a limiting factor.

The following orthogonal comparisons were made between ration treatment types: (1) supplemental protein (rations I, II, and IV) vs. no supplemental protein (rations III and V); (2) 15% salt (ration III) vs. 10% salt (ration V); (3) urea-containing ration (II) vs. cottonseed-containing rations (I and IV); and (4) 15% cottonseed (ration I) vs. 12.5% cottonseed (ration IV).

## RESULTS AND DISCUSSION

Results of the winter feeding and grazing period are presented in Table 2. During this period the highest daily gain was made by the steers fed ration II, although little difference in gain existed among rations II, IV, and V, and the lowest gain was made by the steers fed ration III. Steers fed the rations (III and V) containing no supple-

**TABLE 2.—Three-Year Average Results of Feeding and Grazing Winter Pastures (November-May; 196 Days) 1966-69**

| Item[1] | Ration number | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| Number of animals/year | 12 | 12 | 12 | 12 | 12 |
| Final weight, lb. | 816 | 837 | 777 | 838 | 834 |
| Initial weight, lb. | 455 | 450 | 452 | 454 | 452 |
| Total gain/steer, lb. | 361 | 387 | 325 | 384 | 382 |
| Daily gain, lb. | 1.84 | 1.97 | 1.66 | 1.96 | 1.95 |
| Concentrate intake/head/day, lb. | 6.66 | 6.76 | 2.73 | 4.34 | 5.67 |
| Concentrate intake/lb. gain, lb.[2] | 3.58 | 3.49 | 1.67 | 2.27 | 2.97 |

[1]All values, where applicable, are averages.

[2]Means adjusted for unequal numbers per treatment.

mental protein gained, on the average, significantly less than steers fed rations containing additional protein. The 15% salt in ration III restricted concentrate consumption too much to support adequate gain. Steers fed ration III gained significantly less than steers fed ration V, which explains why these two rations when considered together as one treatment effect (no supplemental protein) were inferior to the other three rations in producing gain. The concentrate intake per pound of gain was highest for the group fed ration I and lowest for the steers receiving ration III. Steers fed 15% cottonseed in the ration (I) gained significantly less than those fed 12.5% cottonseed (IV).

During the period of summer grazing (Table 3) the steers fed the 10% salt and 90% corn ration (V) produced the highest daily gain. Steers fed no supplemental protein (rations III and V) gained significantly faster than steers receiving protein supplements. This response is probably a reflection of slower gains during the winter period. Both of the lots consuming whole cottonseed (rations I and IV) produced low daily gains during the summer period. The ration containing urea (II) produced superior gains when compared with the two similar rations containing cottonseed as a protein source. The consumption of the 15% salt ration (III) was markedly increased during this period as the steers increased in body weight.

**TABLE 3.—Three-Year Average Results of Feeding and Grazing Summer Pastures (May-September; 103 Days) 1966-69**

| Item[1] | Ration number | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| Number of animals/year | 12 | 12 | 12 | 12 | 12 |
| Final weight, lb. | 945 | 978 | 920 | 964 | 981 |
| Initial weight, lb. | 816 | 837 | 777 | 838 | 834 |
| Total gain/steer, lb. | 129 | 141 | 143 | 126 | 147 |
| Daily gain, lb. | 1.25 | 1.37 | 1.39 | 1.22 | 1.43 |
| Concentrate intake/head/day, lb. | 8.11 | 10.11 | 6.25 | 7.65 | 8.96 |
| Concentrate intake/lb. gain, lb.[2] | 6.75 | 7.55 | 4.54 | 6.49 | 6.48 |

[1]All values, where applicable, are averages.
[2]Means adjusted for unequal numbers per treatment.

Daily gains were satisfactory in all lots for the 299-day combined grazing season (Table 4). The daily concentrate consumption for four of the lots was approximately 1% of the animal's body weight, while the steers having access to the 15% salt ration consumed only about 0.5% of their body weight. Steers consuming the urea-containing ration required more feed per pound of gain than the steers fed the other rations. The individual daily concentrate consumption of the ration containing urea was 1.11 pounds greater than the consumption of the

**TABLE 4.—Three-Year Average Results of Feeding and Grazing Winter and Summer Pastures (November-September; 299 Days) 1966-69**

| Item[1] | Ration number | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| Live animal data | | | | | |
| Number of animals/year | 12 | 12 | 12 | 12 | 12 |
| Final weight, lb. | 945 | 978 | 920 | 964 | 981 |
| Initial weight, lb. | 455 | 450 | 452 | 454 | 452 |
| Total gain/steer, lb. | 490 | 528 | 468 | 510 | 529 |
| Daily gain, lb. | 1.64 | 1.77 | 1.57 | 1.71 | 1.77 |
| Total feed intake/steer, lb. | 2141 | 2366 | 1179 | 1639 | 2034 |
| Concentrate intake/head/day, lb. | 7.16 | 7.91 | 3.94 | 5.48 | 6.80 |
| Concentrate intake/lb. gain, lb.[2] | 4.37 | 4.47 | 2.51 | 3.20 | 3.84 |
| Carcass data | | | | | |
| Weight, lb. | 535 | 552 | 495 | 538 | 556 |
| Starting grade—live | 10.9 | 10.9 | 11.1 | 11.2 | 11.0 |
| Final grade—carcass | 10.2 | 10.5 | 9.55 | 9.81 | 10.4 |
| Dressing percent[3] | 60.12 | 59.94 | 57.89 | 59.10 | 60.41 |
| Fat thickness, inches | .36 | .38 | .28 | .33 | .37 |
| Yield grade | 2.62 | 2.56 | 2.29 | 2.45 | 2.57 |
| Rib eye muscle area, sq. in. | 10.19 | 10.28 | 9.65 | 10.19 | 10.36 |

[1]All values, where applicable, are averages.

[2]Means adjusted for unequal numbers per treatment.

[3]Dressing percent is the warm carcass weight less 2% divided by the weight prior to slaughter.

same ration without urea (V). Steers consuming rations containing 10% salt (II and V) had greater daily gains than steers consuming other rations. As a general rule, the greater the daily concentrate intake, the greater was the concentrate intake per pound of gain (Table 4).

Carcass data for the 180 steers are presented in Table 4. The carcass weight each year ranged from 500 to 560 pounds, which is a very popular weight. Dressing percent was lowest for steers consuming ration III, but was very close in the other four lots. Yield grades on all carcasses were very good. The rind fat averaged from 0.28 to 0.38 inch, which is a very desirable thickness. Steers consuming the grain mixtures containing no protein supplement had, on the average, significantly less rind fat than steers consuming protein supplemented rations. The steers receiving no protein supplement averaged less rib eye area than the average for the steers consuming the other three rations. Further analysis indicated that the steers consuming the higher salt-containing ration (III) had significantly less rind fat and rib eye area than the steers consuming ration V. The differences in performance and carcass data between feeding no supplemental protein (rations III and V) and feeding protein are probably not the result of the protein level, but rather the result of the low consumption of ration III, which was a function of the level of salt in the ration.

It should be noted in Table 4 that the final carcass grade was not as high in any of the lots as the starting live grade. In earlier work (Carpenter et al., 1968), concentrates were hand-fed at 1% of the animal's live weight. Thus the amount of concentrates increased as steers increased in weight. The Choice grade was obtained in 45% of the carcasses from steers fed in this manner. When self-fed on pasture the steers did not increase intake on this schedule, thus accounting in part for the lower grades of the carcasses in these trials.

Carcass grades for the three trials are presented in Table 5. In two of the three trials there were no Choice carcasses produced; a large percentage were in the high Good grade, however. This would indicate that with the amount of feed consumed, a slightly longer feeding and grazing period was needed. The highest grading carcasses, as an average for the three years, were produced in the lot receiving ration II. The carcass grades by ration, from the highest to the lowest, were as follows: Ration II, V, I, IV, and III. Carcass grades were very similar for animals receiving the first four rations listed above. Animals consuming ration III had significantly lower carcass grades than steers receiving a similar ration containing less salt (V).

**TABLE 5.—Carcass Grades for Cattle Fed During the Three-Year Period (180 Steers)**

| Ration | Grade | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Choice + | Choice | Choice − | Good + | Good | Good − | Standard + | Standard |
| I | | 2 | 4 | 7 | 13 | 7 | 3 | |
| II | 1 | 2 | 3 | 9 | 13 | 8 | | |
| III | | 1 | | 4 | 14 | 14 | 2 | 1 |
| IV | | 1 | 1 | 5 | 16 | 12 | 1 | |
| V | | 5 | 2 | 6 | 16 | 3 | 4 | |

## SUMMARY

Previous work at the Northeast Louisiana Agricultural Experiment Station and the Macon Ridge Branch Station has shown that weanling beef steer calves can be held economically for feeding on pasture until ready for slaughter. With increases in land prices and the cost of maintaining a cow, this approach to finishing slaughter steers is becoming more popular.

Earlier studies indicated that a daily concentrate intake of 1% of the animal's live weight on pasture was sufficient to produce the grade and weight carcasses in demand on today's market. Self-feeding on pasture was considered as a means of reducing labor costs and the daily chore of feeding. The work reported herein compares five rations self-fed to grazing steers for a period of 299 days.

As indicated by the results of this study, steer calves can be finished on pasture with a limited amount of concentrates. Generally speaking, less labor and feeding know-how are required in a pasture fattening program where the concentrates are self-fed. There is considerable potential in Louisiana and the southern United States for using good-quality pasture and a limited amount of grain in a steer fattening program.

All rations used in this study produced acceptable gains, carcass weights, and grades. It is possible that in certain years the length of feeding should be increased by 25 to 30 days. In the future, if grain prices become favorable, more feeding may be done in this area, but at present most of the nutrients for beef cattle in any program should be furnished by good-quality pastures.

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